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ABSTRACT

The effects of reinforcement conditions on the test scores of 15 middle income and 15 low income children labeled learning disabled and behaviorally disordered were assessed. A repeated measures design was used, with each subject tested under conditions of no reinforcement, immediate tangible reinforcement, and immediate social reinforcement. Results indicated that the test scores of the population studied can be significantly increased by reinforcement conditions. The superiority of either reinforcement condition over the other was not established. No significant income level reinforcement or income level reinforcement type interactions were observed. (Possible explanations of the nonsignificant findings are offered.) (Author/CL)

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EFFECTS OF REINFORCEMENT CONDITIONS ON THE TEST SCORES OF CHILDREN LABELED LEARNING AND BEHAVIORALLY DISORDERED

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Abstract

The purpose of this study was to assess the effects of reinforcement conditions on the test scores of middle and low income children labeled learning and behaviorally disordered. A repeated measures design was used, with each subject tested under conditions of no reinforcement, immediate tangible reinforcement, and immediate social reinforcement. Results indicated that the test scores of the population studied can be significantly increased by reinforcement conditions. The superiority of either reinforcement condition over the other was not established. No significant income level reinforcement or income level reinforcement type interactionss were observed.

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The late sixties and the 1970s have marked a retrospective period in the historical development of special education. Efficacy studies have caused special educators to question their very existence (Cegelka and Tyler, 1970; Nelson and Schmidt, 1971). The culmination of this movement has resulted in the congressional passage of Public-Law 94-142, a law aimed at rectifying and alleviating the problems associated with the education of children labeled exceptional.

One of the areas specifically dealt with in Public Law 94-142 has been the problem of educational assessment. Educators have used educational testing to identify children's learning strengths and weaknesses, as in the psychoeducational diagnostic and prescriptive teaching model (Arter and Jenkins, 1975). Others have employed tests to label and place children in special educational environments, the efficacy of which could be severely questioned (Cegelka and Tyler, 1970; Nelson and Schmidt, 1971). Several diagnosticians have utilized educational tests to make a medical diagnosis, such as organic brain dysfunction (Allison, Blatt and Zimet, 1968). Criterion-referenced assessments and behavioral observations, although not always considered standardized assessment instruments, aid teachers in identifying specific educational objectives from which they can commence their educational interventions. Under provisions outlined in Public Law 94-142, educational assessment will serve to facilitate completion of individual educational plans. Finally, standardized test performance has been a mainstay in the evaluation and comparison of remedial programs.

The above uses of standardized tests make the powerful assumption that the test scores are sampled under optimal testing conditions, and all children are motivated to operate at the height of their capabilities (Conolly, Nachtman, and Prichett, 1971; Woodcock, 1973). This assumption may well be erroneous. If it can be experimentally demonstrated that an individual's test scores can be significantly modified by differing reinforcement conditions, one would be compelled to question the validity of the assumption of optimal individual motivation in standardized testing.

Problem

The purpose of this study was to assess the effects of systematic reinforcement conditions on the math, reading, and language test scores of middle and low income children labeled learning and behaviorally disordered, while assessing the differential effects of immediate tangible reinforcement and immediate social reinforcement on test performance. Because several researchers have concluded that the test performances of low income children are more susceptible to tangible reinforcement and the test performances of their middle income counterparts appear to be more susceptible to social reinforcement, (Douvan, 1956; Haggard, 1954; Klugman, 1944), this study also examined these differential interaction effects.

Related Research

Research on the effectiveness of reinforcement conditions on testing performance has been inconclusive. Many researchers concluded that test performance appears to be susceptible to systematic reinforcement procedures (Ayllon and Kelly, 1972; Bergan, McManus, and Melchert, 1971; Edlund, 1972; Hurlock, 1925; Smeets and Striefel, 1975). Other researchers reported no significant differences in the test performance of subjects in a control group and those in an experimental group receiving some type of reinforcement during the assessment process (Benton, 1936; Maller and Zubin, 1932; Tiber and Kennedy, 1964). Surprisingly, Roth and McManus (1972) observed that reinforcement conditions depressed the test performance of organically impaired retarded adults.

Lack of motivation in the testing environment may be particularly characteristic of low income and minority children. These two groups embody a disproprotionately large percentage of children labeled learning and behaviorally disordered (Gilhool, 1973; Mercer, 1975). The over-representation of these groups in the learning and behaviorally disordered population is in part due to the bias inherent in many educational and intelligence tests (Adler, 1968). However, the performance of minority and low income children may be further impaired by their lack of achievement motivation (Douvan, 1956; McClelland, 1961; Rosen, 1959), thus increasing the probability of their being identified with this population.

Prior studies suggest there to be a significant income-reinforcement type interaction in the learning of non-symbolic perceptual tasks, with low income children performing best under conditions of tangible reinforcement, while their middle income counterparts perform best under conditions of social reinforcement or no reinforcement (Terrell, Durkin and Wiesly, 1959; Terrell and Kennedy, 1957; Zigler and Delabry, 1962; Zigler and Kanzer, 1962). Limited evidence exists to suggest the generalization of this income-level reinforcement type interaction to the testing milieu (Douvan, 1956; Haggard, 1954; Klugman, 1944).

Method

Subjects

Whereas other related studies (Ayllon and Kelly, 1972; Benton, 1936; Edlund, 1972; Maller and Zubin, 1932; Smeets and Striefel, 1975) used individuals labeled retarded, or normal functions as the sample groups, this study included children labeled learning and behaviorally disordered. The learning and behaviorally disordered category refers to those children previously labeled learning disabled, mildly emotionally disturbed, or educable mentally retarded by school officials. These previously distinct diagnostic labels are grouped together under the label learning and behaviorally disordered as they share a commonality in etiological factors and teaching methods (Hallahan and Kauffman, 1976). Subjects were 15 middle income and 15 low income children labeled learning and behaviorally disordered, ages 7 years through 10 years, 3 months, who were judged capable of taking the Word

Identification Subtest of the Woodcock Reading Test (Woodcock, 1973), the Numeration, Addition, and Word Problem Subtests of the Keymath (Conolly, Nachtman, and Pritchett, 1971), and the Verbal Expression Subtest of the Illinois Test of Psycholinguistic Abilities (Kirk, McCarthy and Kirk, 1968). Capability of taking the Word Identification Subtest of the Woodcock Reading Test was based on the subject's ability to verbally identify at least 22 of the 26 letters of the alphabet when the letters were visually presented. Capability of taking the Keymath Subtests was judged by the subject's ability to verbally identify the numerals 1 to 20 with 85% accuracy when the numerals were presented visually. Capability of taking the Verbal Expression Subtest of the ITPA was judged by the subject's ability to label orally representations of 10 familar objects: gun; horse; envelope; ball; block; button; nail; key; banana; pencil. Income group was determined by using Federal Income Guidelines on Family Size and Income Scale for Free Meals and Free Milk (1977), the Index of Status Characteristics (Warner, Meeker, and Eells, 1960) and the Index of Social Position (Hollingshead and Redlich, 1958).

Of those tested, 20 were males; 10 females. Of those in the sample group, 24 were in classes for the learning disabled; 6 were in classes for the educable mentally retarded.

Instruments

Most investigators have examined the effects of reinforcement on I.Q. scores

or reading test scores (Ayllon and Kelly, 1972; Bergan, McManus and Melchert, 1971; Edlund, 1972; Maller and Zubin, 1932; Smeets and Striefel, 1975; Tiber and Kennedy, 1964). However, none of the researchers examined the effects of reinforcement conditions across math, reading, and language tests. In an attempt to study the generalization of reinforcement effects across math, reading, and language tests, three essential areas in the diagnosis of children labeled learning and behaviorally disordered, the Word Identification Subtest of the Woodcock Reading Test (Woodcock, 1973), the Numeration, Addition, and Word Problem Subtests of the Keymath (Conolly, Nachtman and Pritchett, 1971), and the Verbal Expression Subtest of the Illinois Test of Psycholinguistic Abilities (Kirk, McCarthy and Kirk, 1968) were selected as the measurement instruments.

Procedures

A repeated measures design on three dependent variables (math, reading, and language) was used to conduct the experiment. Each subject was exposed to each treatment or absence of treatment at different times during the experiment. Thus, subjects were administered the math, reading and language tests three times, under the three different conditions.

Treatment consisted of:

1. Treatment one, no reinforcement, where the examiner administered the tests to the subject according to the standard instructions outlined in the test manual;

2. Treatment two, immediate tangible reinforcement, where the examiner immediately reinforced every correct response with a tangible reinforcer. Because

subjects might vary as to which reinforcer was effective for a specific child, prior to the testing, subjects were presented with a tangible reinforcement menu (Addison and Homme, 1966) of tangible objects from which they picked a tangible reinforcer which was used in the testing situation. Prior to the administration of the first item, the examiner told the subject "Every time you give a correct answer, I'll give you a _____" (tangible reinforcer of the child's choice). Subjects received no social reinforcement or verbal feedback with the tangibles, nor were they penalized for incorrect responses;

3. Treatment three, immediate social reinforcement where the examiner immediately reinforced each correct response which the testee made with a positive verbal statement such as "Good", "Fine", "Right", "Very Good", "Correct", or "Excellent." Subjects did not receive a negative verbal comment for an incorrect response.

To minimize the effects of repeated testing and multiple treatment carry-over, the order and the sequence of the exposure to the treatment conditions were varied.

Data Analysis

Data were analyzed using three, separate (math, reading, language) multivariate repeated measures one-way designs with two levels and three scores for each level. In order to test the research hypotheses, two simple linear contrasts

were formed by transforming the dependent measures into new outcome variables. The initial contrast, Y_1^* compared the effects due to being in the no reinforcement condition as opposed to the average of the effects of being in the two reinforcement conditions. The second contrast, Y_2^* examined the difference between the two reinforcement conditions. Hypotheses were tested at the .05 alpha level.

Results

Results of the data analyses across the three dependent variables are reported in Table 1. As the table indicates, significant differences were found between the test scores of children labeled learning and behaviorally disordered obtained under no reinforcement and reinforcement conditions, with reinforcement conditions being statistically superior. Results, suggested no significant difference in the test scores of children labeled learning and behaviorally disordered obtained under conditions of immediate tangible reinforcement and immediate social reinforcement. No significant interaction effects for the income X reinforcement type variables were found.

Insert Table 1 Here

Discussion

The results of this study supported the contention that test performance is susceptible to systematic reinforcement conditions. This finding is consistent with the conclusions reported by Ayllon and Kelly (1972), Bergan, McManus, and Melchert (1971), Edlund (1972), Hurlock (1925) and Smeets and Striefel (1975), and lends support to the generalization of the effects of reinforcement techniques on test performance across categorical populations and standardized educational assessment instruments.

One possible explanation for the superiority of reinforcement conditions is the positive effects on the testee's test-taking behaviors. Reinforcement conditions may have served to activate a testee's testwiseness in order to increase the probability of receiving the reinforcer. Under the experimental conditions children were observed to be more cautious and less apt to respond to an item without carefully reviewing the information presented in the question and the possible responses. This was reflected in the duration of the testing sessions. The mean duration of the testing session, under conditions of no reinforcement, tangible reinforcement, and social reinforcement were 12 minutes 50 seconds, 14 minutes 45 seconds, and 13 minutes 40 seconds respectively.

The conclusion implied by this finding is that children ages 7 years through 10 years 3 months, labeled learning and behaviorally disordered, perform better in the testing situation when they are reinforced. Therefore, traditional assessment techniques should be revised to include reinforcement techniques in order to insure accurate measures of instructional levels from which to commence the remedial

program. However, it must be noted that the information accrued from test results obtained under conditions of reinforcement would be limited, in view of the fact that a majority of standardized tests (Berry, 1967; Carrow, 1973; Conolly, Nachtman and Pritchett, 1971; Dunn, 1965; Jastak and Jastak, 1965; Kirk, McCarthy and Kirk, 1968; Otto, 1972; Roach and Kephart, 1966; Woodcock, 1973) were standardized and normed under conditions of no reinforcement. Therefore, comparisons of the test results obtained under reinforcement conditions with the norms, grade equivalents, and diagnostic information available in the test manuals are invalid, as the guidelines for test administration specified in the test manual have been violated. Educators could resolve this dilemma by testing children under reinforcement conditions and interpreting the results obtained from these assessments as criterion-referenced information rather than norm-referenced information. However, since the findings of this study also question the validity and reliability of static testing and the procedure of assigning diagnostic labels to children based on their performance on short term, norm-referenced standardized tests, educators should consider eliminating the use of static norm-referenced testing as a means for assigning diagnostic labels to children and begin to identify and empirically validate alternative means for identifying the educational needs of children. One possible alternative to norm-referenced testing is direct and continuous observation. Eaton and Lovitt (1972) found direct and continuous observation to be superior to achievement testing in the areas of placement, communication and evaluation. Direct and continuous assessment is particularly useful in working with the learning and behaviorally disordered population as it :

"1) allows for precision in measurement; 2) is based on empirical data obtained from the child's performance; 3) suggests specific remedial teaching methods; 4) facilitates individualization of instruction; 5) provides for continuous evaluation of teaching procedures." (Hallahan and Kauffman, 1976, p. 55)

Findings of this study demonstrated the malleability of test scores as a result of reinforcement conditions. However the superiority of either reinforcement condition over the other was not established. The non-significant findings appear to be consistent with the observations of Bergan, McManus and Melchert (1971), Klugman (1944), and Tiber and Kennedy (1964), who reported no significant differences between the two reinforcement conditions on overall test performance. This finding suggests that educators who choose to use reinforcement conditions in the assessment process will find either reinforcement condition equivalent.

Results of the analysis showed there were no significant interactions between income level and reinforcement or income level and reinforcemetn type. This result contradicts the research of Shores (1968), Terrell, Durkin and Wiesly (1959), Terrell and Kennedy (1957), Zigler and Delabry (1962), and Zigler and Kanzer (1962) whose findings suggested a significant interaction between social class and type of reinforcement. However, the inconsistency in the findings may be explained by the nature of the task and the sample group studied. In the present study, the tasks were highly symbolic and cognitively oriented, while tasks in prior studies (Shores, 1968; Terrell, Durkin and Wiesly, 1959; Terrell and Kennedy, 1957; Zigler and Delabry, 1962; Zigler and Kanzer, 1962) were of a more non-symbolic and perceptual nature.

Additionally, prior studies dealt with the income-level type interaction during a learning situation, while this study was concerned with the generalization of this interaction to the testing situation. While there exists some evidence to suggest the generalization of this interaction to the testing situation, this evidence is limited (Douvan, 1956; Haggard, 1954; Klugman, 1944).

Another possible explanation of the non-significant findings may be due to the sample group. Several investigators explained the differential reinforcement preference of the two socio-economic groups to be an outgrowth of prior experience with success, with the repeated failure experiences of the low income child leading to a greater susceptibility to reinforcement and a lowered expectancy of reinforcement (Davis, 1943; Gans, 1962). However, middle income and low income children labeled learning and behaviorally disordered may be more homogeneous than heterogeneous in that both groups have had repeated school failures which could lead to equivalent susceptibility and expectancy of reinforcement.

The heterogeneity of the population labeled learning and behaviorally disordered makes research on this group particularly difficult. Since the category of learning and behaviorally disordered encompasses a wide scope of individuals and behaviors, an effective experimental design, using this group as a sample, must control for the variation than can be attributed to individual differences. A repeated measures design; such as the one employed in this study, controls for these individual differences and would be an appropriate experimental design for studying the population called learning and behaviorally disordered. Future special education research should consider the repeated measures design in studying this population and other categorical populations.

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TABLE 1

UNIVARIATE F TESTS FOR MATH, READING AND LANGUAGE SCORES ON TRANSFORMED VARIABLES Y_1^* AND Y_2^*

Source	Variable	Univariate F	$p <$
MATH			
Main Effects	Y_1^*	8.9513	.0058
Main Effects	Y_2^*	0.4648	.5011
Interaction	Y_1^*	0.0310	.8616
Interaction	Y_2^*	1.6582	.2084
READING			
Main Effects	Y_1^*	34.2948	.0001
Main Effects	Y_2^*	0.8407	.3671
Interaction	Y_1^*	0.0207	.8866
Interaction	Y_2^*	2.1521	.1536
LANGUAGE			
Main Effects	Y_1^*	4.7602	.0377
Main Effects	Y_2^*	3.5697	.0693
Interaction	Y_1^*	0.2699	.6076
Interaction	Y_2^*	0.2231	.6504

Degrees of freedom for the univariate F tests are: 1, 28